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Free Flow Traffic Noise in Three Malaysian Cities

RINGKASAN

Kertas ini melaporkan suatu kajian mengenai paras bunyi lalulintas di tiga buah bandar besar di Semenanjung Malaysia. Pada keseluruhannya, paras bunyi yang diperolehi adalah tinggi dan mempunyai hubungan rapat dengan keadaan lalulintas. Cadangan untuk mengatasi masalah ini juga telah diberikan.

SUMMARY

This paper reports a study on free flow traffic noise in three cities in Peninsular Malaysia. It is found that generally the noise level is high and correlates with the type of traffic. A few suggestions on control measures are made.

INTRODUCTION

In an urban environment the major sources of noise associated problems originate from motor vehicles which generate power as high as twenty times more than all other sources combined (Bugliarello, 1976). Although noise levels vary with different types of vehicle in a steady traffic flow the noise generated attains an almost constant level, with noise emitted by certain vehicles (such as heavy trucks, lorries, buses and motorcycles) being predominant. Stephenson and Vulkan (1968) have pointed out that these vehicles produce noise up to twice as loud as that from private cars.

In Malaysia, studies on traffic noise have been limited to the two major cities of Kuala Lumpur (Yeow *et al.*, 1972, Terazaki and Fukuhara, 1979) and Penang (Tan, 1982). Their studies have shown that although the noise level is lower than that found in many other Asian cities, in some areas, however, the levels were as high as those found in Los Angeles and New York (Kimoto and Fukuhara, 1980). The very rapid increase in the number of motor vehicles on Malaysian roads will undoubtedly increase traffic noise in the future. Studies and surveys of the present noise climate will provide very useful data especially for town planners and developers of land use.

METHOD

In this study, the noise levels at 76 sampling sites covering the urban areas of Kuala Lumpur, Seremban and Johor Bahru were measured using the noise level analyzer. (Bruel and Kjaer type 4426). Measurement sites were chosen on straight, level roads away from traffic interruptions such as road junctions, traffic lights or pedestrian crossings. Roads with reflecting surfaces such as tall buildings and trees were avoided.

At each site the noise level was measured at 0.2s intervals for 1000 seconds and its mean level was calculated. The number of passing vehicles were counted simultaneously and grouped into two main categories (Lewis, 1973) namely heavy vehicles which included lorries, buses and motorcycles, and light vehicles consisting of cars, vans and pick-ups. To obtain an average daytime noise level, measurements were made during the normal traffic conditions on working days. Peak hours of 0800–0900 hrs, 1200–1400 hrs and 1600–1800 hrs were avoided. However, whole daytime hourly measurements were made at a few selected sites.

RESULTS AND DISCUSSIONS

A summary of the mean noise levels is shown in Table 1. The mean level in Kuala Lumpur was found to be the highest among the three areas. In the town centre the mean level in Kuala Lumpur ranged from 71.9 to 75.9 dBA, in Johor Bahru from 64.3 to 69.2 dBA and in Seremban from 64.1 to 67.5 dBA. The levels were seen to decrease at sites further from the town centre and from main roads leading to the town centre.

A typical daytime variation of the noise level at Kuala Lumpur is shown in *Figure 1*. The mean levels remained fairly constant, within the 73-74 dBA range during the whole measurement

TABLE 1
Summary of mean noise level (in dBA)

Category of Location	Kuala Lumpur	Seremban	Johor Bahru
Town centre, commercial	71.9–75.9	64.1–67.5	64.3–69.2
Main roads, commercial	67.4–73.6	61.9–65.5	61.8–65.7
Sub-urban, residential and light industries	–	56.7–62.7	57.5–64.5
Suburb, residential	–	53.6–56.0	53.6–55.4

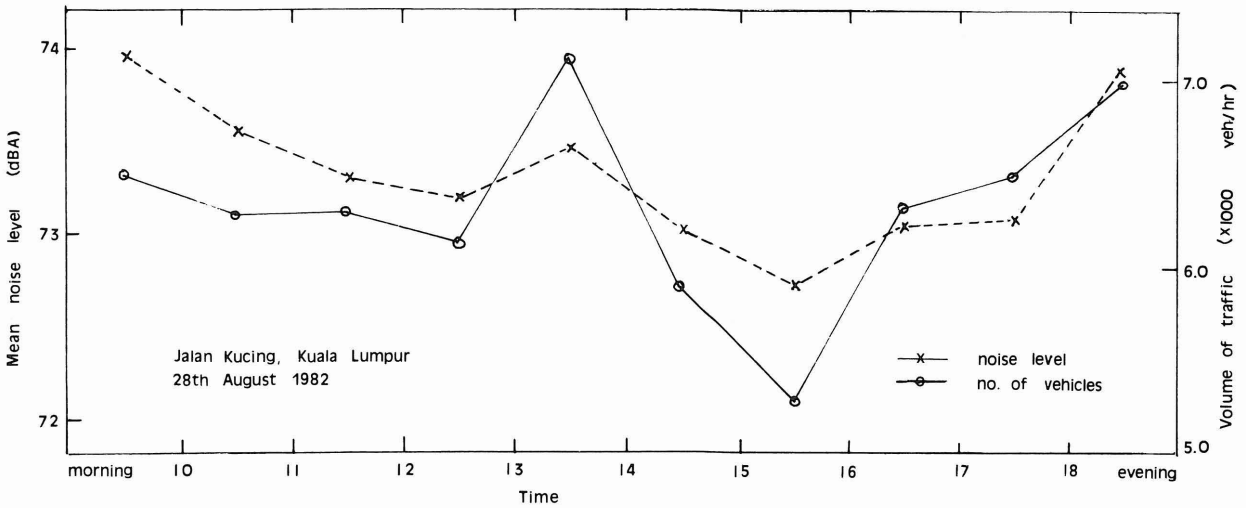

Fig. 1. A typical daytime variation of noise level and traffic volume.

time with a slight increase during the rush hours (1200–1400 hrs. and 1600–1800 hrs.). The 24 hour pattern of continuous measurements in Kimoto and Fukuhara (1980) study for the same area featured a high noise level from about 0700 hrs. until around 2100 hrs. and fell to about 5-10 dBA below the mean daytime level after midnight until around 0700 hrs. the next morning. No wholeday measurements were made in Johor Bahru and Seremban.

Figure 1 also shows the relation between noise level and traffic volume. In general the noise level was higher for greater traffic volumes. *Figure 2* indicates that the noise level increased linearly at first as the traffic volume increased at the rate of about 5 dBA for every two-fold increase in traffic volume. The increase then became more gradual, and for traffic volumes greater than about 3500 vehicles per hour, the level became almost constant irrespective of the increase in the number of vehicles. The work of Stephenson and Vulkan (1966) for London traffic showed a similar pattern.

Attempts were also made to determine the dependence of noise level on the traffic composition, but there were insufficient data for a statistically significant conclusion. However, it was noted that the levels were slightly higher for a higher percentage of heavy vehicles of the same traffic volume.

CONCLUSION

The findings in this study show that traffic noise problems do exist in these three towns but are confined to the central commercial areas.

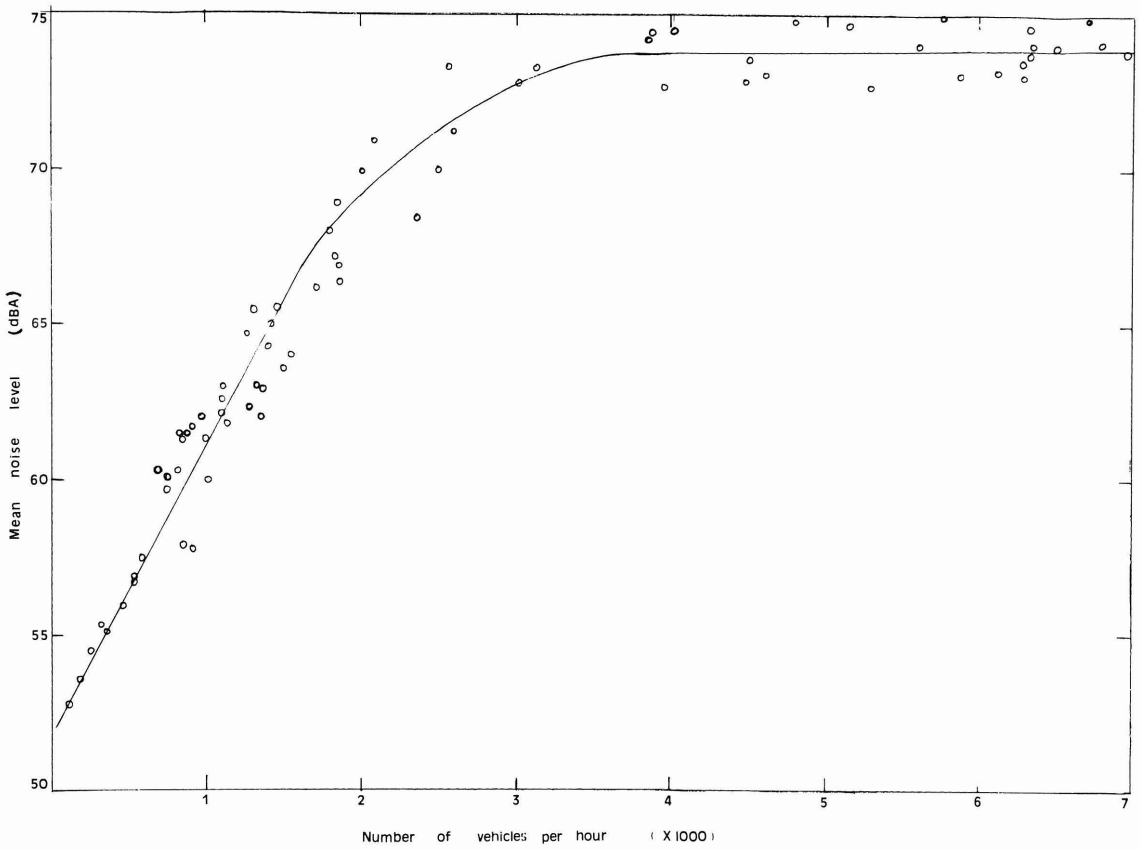

Fig. 2. The relationship between noise level and traffic volume.

By United Kingdom standards, these levels are far above the acceptable limit. The traffic noise standard in the U.K. is 68 dBA using the L_{10} 18h index, where the level exceeds 10% of the time measured hourly between 0600 and 2400 hrs. In Malaysia, acceptable levels are yet to be formulated. Under the provisions of the motor vehicles (Construction and Use) Rules 1959, it is a statutory requirement for motor vehicles to be equipped with silencers and for their maintenance; and provisions exist for motorists to be prosecuted for making excessive noise by using defective vehicles. But this legislation sets no specific noise limits and hence makes enforcement difficult.

In view of the present growth of traffic volume, the problem could become more serious in the near future. There is a need for more precise legislation on noise control, including the imposition of a statutory acceptable noise limit for all new motor vehicles manufactured, as is mandatory in many countries; or by zoning specific areas where traffic have to conform to stipulated noise limits as is commonly done in Japan.

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